

REMARKS

This Amendment is filed with a one month extension in response to the Office Action mailed on December 14th, 2004. All objections and rejections are respectfully traversed.

Claims 1 to 71 are currently pending in the case.

Claims 1, 3, 5-9, 14, 18, 20, 22-26, 30, 33-35, 39 and 41 have been amended to better claim the invention.

No new claims have been added.

At page 2 of the Office Action claims 1-4, 9-16, 18-22, 25-28, 31, 32, 36-42, 45-54, and 57-71 were rejected under 35 U.S.C. §103(a) as obvious over Mandany et al., US Patent No. 5,935,242, issued on August 10th, 1999 (hereinafter Mandany), in view of ordinary skill in the art.

The present invention, as set forth in representative claim 1 comprises in part:

1. A method for fast reboot of a computer having an attached disk array and an internal random access memory (RAM) comprising the steps of:
 - retaining a copy of an operating system kernel at a reserved storage location of the RAM;*
 - performing predetermined reboot operations with a boot mechanism; and
 - reloading an operative operating system at a location in the RAM based upon the copy of the operating system kernel retained at the reserved storage location,* after the step of performing the predetermined reboot operations.

Mandany describes a system for speeding the reboot of a “network-booted computer” that does not have a local hard drive for storing an operating system. *See* col. 1, lines 15-25. The system avoids reloading a static portion of the operating system if the existing operating system is valid. *See* col. 2, lines 16-19. Mandany segments the computer’s memory (Fig. 4, item 62) into a number of regions including: a Read-Only Data region (Fig . 4, item 64) that stores the “operating system instructions (e.g., machine code) and other data that is not changed during the operation of the computer”, a Read-Write Initialized Data region (Fig . 4, item 66) that contains “variables and other data that is initialized during the compilation of the operating system or during the initial booting of the computer”, and a Snapshot Data region (Fig . 4, item 70) that contains a copy of the Read-Write Initialized Data captured just after the initial booting of the computer. *See* col. 5, lines 50-52, 59-67 and col. 6, lines 11-20. To perform a “Warm Boot” the Read-Only Data containing the operating system code, if valid, is left in place; and the rest of the memory, with the exception of the Snapshot Data, is cleared. The Snapshot data is then written to the Read-Write Initialized Data region. *See* col. 7, lines 66 to col. 8, lines 46 and Fig. 6. In this way, the operating system is rebooted without reloading the majority of the operating system. *See* col. 9, lines 10-18.

The Applicant respectfully urges that Mandany does not show the Applicant’s claimed novel “*retaining a copy of an operating system kernel at a reserved storage location of the RAM*” and “*reloading an operative operating system at a location in the RAM based upon the copy of the operating system kernel retained at the reserved storage location.*”

The Applicant teaches storing a copy of the operating system kernel at a special reserve storage location and then reloading the operative operating system from this copy. The copy and the operative operating systems are stored at different locations. In sharp contrast, Mandany only describes a single “operating system” stored in RAM, and has no conception of separate “operative” and copy operating systems. To perform a “Warm Boot,” Mandany leaves the “machine code” of the operating system in place, and simply clears the variables associated with the operating system (stored in the Read-Write Initialized Data region) and then replaces them with variables stored in a snapshot (stored in a Snapshot data region). Such an approach has numerous shortcomings. Most notably, as Mandany admits, any time the operating system code itself becomes corrupted, a full (cold) reboot must be performed. *See* col. 8, lines 10-18. Such a limitation is entirely unsatisfactory for high reliability (99.999% uptime) applications. Applicant’s novel system and method, overcomes this and other shortcoming by replacing the entire operative operating system from the copy of the operating system kernel.

The Applicant respectfully urges that Mandany, either alone, or in combination with ordinary skill in the art, is legally insufficient to render the presently claimed invention obvious under 35 U.S.C. § 103 because of the absence of Applicant’s claimed novel *“retaining a copy of an operating system kernel at a reserved storage location of the RAM”* and *“reloading an operative operating system at a location in the RAM based upon the copy of the operating system kernel retained at the reserved storage location.”*

At page 5 of the Office Action claims 5-8, 17, 23, 24, 29, 30, 33-35, 43, 44, 55, and 56 were rejected under 35 U.S.C. §103(a) as being obvious over Mandany in view of VanRooven et al., U.S. Patent No. 5,935,242 issued on July 8, 2003 (hereinafter VanRooven).

The present invention, as set forth in representative claim 33 comprises in part:

33. An operating system for a computer having an operating system kernel stored in a random access memory of the computer comprising:

a warm reboot instruction, responsive to a predetermined reboot condition, that sets an indicator in a boot mechanism of the computer to perform a warm reboot process that includes predetermined boot steps that are fewer than the boot steps performed by the boot mechanism in response to a full reboot instruction; and

a compressed kernel image located at a reserved storage space in the random access memory, the compressed kernel image being adapted to be accessed to reload the compressed kernel image into the random access memory during a warm reboot process.

VanRooven describes a system for minimizing use of expensive solid state ROM in small electronic devices. *See* col. 3, lines 16-19. To this end, VanRooven discloses storing a copy of an operating system on a “read-only disk partition” (*/boot* partition) of a “disk based ROM” (a disk drive), rather than on a solid state ROM. *See* col. 2, line 66 to col. 3, line 6 and col. 3, lines 47-67. At power-up, the copy of the operating system on the disk is loaded from the */boot* disk partition into a RAM. *See* col. 3, lines 7-12. Further, the copy of the operating system on the */boot* disk partition may be compressed, and in this case, it is decompressed when loaded into the RAM. *See* col. 5, lines 44-55, and col. 6 lines 52-60.

The Applicant respectfully urges that the combination of Mandany and VanRooven does not show the Applicant's claimed novel "*a compressed kernel image located at a reserved storage space in the random access memory, the compressed kernel image being adapted to be accessed to reload the compressed kernel image into the random access memory during a warm reboot process.*"

While the Applicant stores a *compressed kernel image at a reserved storage space in the random access memory*, both Mandany and VanRooven are silent concerning such a feature. As described above, Mandany does not even store a second copy of the operating system. Instead, Mandany performs its "Warm Boot" by leaving the "machine code" of the operating system in place, clearing the variables associated with the operating system (stored in the Read-Write Initialized Data region) and then replacing them with variables stored in a snapshot (stored in a Snapshot data region). Thus Mandany has no need for, and no conception of, a separate compressed kernel image.

VanRooven is similarly lacking such a feature. Instead of storing a *compressed kernel image at a reserved storage space in the random access memory*, VanRooven discloses storing a compressed copy of an operating system on a "read-only disk partition" of *a disk based ROM (a hard disk)*. See col. 2, line 66 to col. 3, line 6 and col. 3, lines 47-67. Storing an operating system on a hard disk, necessitates a disadvantageous "cold boot" described by the Applicant in the Background section of the Specification. The Applicant describes this conventional method at page 3, lines 17-22 stating:

Within a known storage system, the storage operating system is loaded from a kernel image that resides in compressed form at a location on the interconnected disk array. The compressed kernel image is located on the

disk array by a finder algorithm, and loaded at an appropriate location in memory. It is then extracted into an operative kernel based upon a de-compression algorithm, and placed in a predetermined address space in the file server's memory.

The Applicant goes on to point out the shortcomings of this technique at page 5, lines 1-12 stating:

The locating and reading of the kernel from disk into memory may consume approximately ten seconds on a fast-running file server....

A full or "cold" boot process as a result of a reboot command, therefore, consumes significant file server time and resources. Clearly, the more quickly a reboot is accomplished, the less time clients awaiting file service must wait for that service to resume. Because reboot time is downtime from the perspective of clients, saving even a few seconds during reboot can significantly affect overall system availability—particularly where many attached clients exist and a multiplicity of reboots may be required throughout an operating year. In fact, to attain 99.999% system reliability (the desired "Five Nines"), downtime must be limited to only about five minutes per year.

Thus, VanRooven merely discloses a conventional disk based technique and accordingly teaches away from Applicant's invention.

The Applicant respectfully urges that Mandany and VanRooven, either alone or in combination, are legally insufficient to render the presently claimed invention obvious under 35 U.S.C. §103 because of the absence of Applicant's claimed novel "***a compressed kernel image located at a reserved storage space in the random access memory, the compressed kernel image being adapted to be accessed to reload the compressed kernel image into the random access memory during a warm reboot process.***"

In the event that the Examiner deems personal contact desirable in disposition of this case, the Examiner is encouraged to call the undersigned attorney at (617) 951-3078.

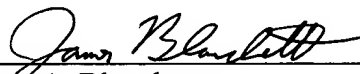
All independent claims are believed to be in condition for allowance.

All dependent claims are believed to be dependent from allowable independent claims.

Applicant respectfully solicits favorable action.

Please charge any additional fee occasioned by this paper to our Deposit Account
No. 03-1237.

Respectfully submitted,



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